

Traffic Records

A Highway Safety Program Advisory

NOTES AND DISCLAIMERS

NOTE: The terms "Highway Safety Information System" and "Traffic Records System" are interchangeable. This Advisory uses the term, "Traffic Records System" to be consistent not only with its traditional use, but also with references in many of the publications and documents listed at the back of this Advisory, as well as its use in various pieces of legislation.

NOTE: The term “crash” is used in lieu of the term “accident” in this document. Many of the references cited in this document use the term “accident” as do many of the laws defining crashes or accidents at the State level. This Advisory recommends that States use the term “crash” and reflect that change in legislation.

Preface

In the Highway Safety Act of 1966, the importance of State traffic records system data was clearly understood by Congress. Language in the Act reads: "In addition such uniform guidelines shall include, but not be limited to, provisions for an effective record system of accidents (including injuries and deaths resulting there from), accident investigations to determine the probable causes of accidents, injuries, and deaths, vehicle registration, operation, and inspection, highway design and maintenance (including lighting, markings, and surface treatment), traffic control, vehicle codes and laws, surveillance of traffic for detection and correction of high or potentially high accident locations, ...as necessary to improve highway safety, and emergency services."

The importance of State traffic records system data was further emphasized in the House of Representatives Report Number 1700, 89th Congress, 2nd Session which reads in part: "...Uniform, complete, and accurate accident reports, stored in one center in every State, subject to rapid retrieval and analysis, and compatible with a national record system at the Federal level, can tell us not only how many accidents we have, but what kind of accidents they are, where and when they occur, their physical circumstances and the people, injuries, death and damage they involve, what emergency services and enforcement agencies responded and how, and what judicial actions resulted, to mention only the most obvious possibilities.

".... No other part of the State [Highway Safety] program is as basic to ultimate success, nor as demanding of complete cooperation at every jurisdictional level [as the State Traffic Records Program]"

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INTRODUCTION

TRAFFIC RECORDS

A HIGHWAY SAFETY PROGRAM ADVISORY

Why do States Need a Traffic Records System?

The number one public safety problem in America continues to be deaths, injuries and property damage from motor vehicle crashes. The economic impact of motor vehicle crashes is in the hundreds of billions of dollars annually (estimated to be in excess of 230 billion dollars in the year 2000). While the fatal and injury crash *rates* declined to historic lows over the decade of the 1990s and into the new millennium, the *actual number* of fatal and injury crashes remained essentially unchanged over this same period of time. If progress is to be made in reducing these numbers, State traffic records systems must become more technologically sophisticated to provide more timely, more accurate, more integrated, more accessible and more standardized and uniform data.

Data from the State's traffic records system are essential to carrying out the three principal functions of managing the state's safety programs: planning (problem identification), operational management or control (monitoring), and evaluation (determining a program's impact). As stated in the *National Agenda for the Improvement of Highway Safety Information Systems*, published in 1996 by the National Safety Council's Traffic Records Committee, "Highway safety information systems provide the information which is critical to the development of policies and programs that maintain the safety and the operation of the nation's roadway transportation network."

Today's highway safety professional needs reliable, accurate, and timely data to make decisions about traffic safety problems and countermeasures, and for program management and evaluation. This Advisory is intended to provide the requirements framework within which a state can establish the optimum system to support its data needs for highway safety program management.

What is a Traffic Records System?

A State traffic records system is generally defined as a virtual system of independent real systems, which collectively form the information base for the management of the highway and traffic safety activities of a State and its local subdivisions. The highway safety information system comprises the hardware, software, personnel and procedures that capture, store, transmit, analyze, and interpret the data in these separate systems. The core components of this collection of independent systems are the crash, roadway, driver, vehicle, citation/adjudication, and injury control data systems. These are considered as core components because each is intended to represent a census of all the events appropriate to that database, e.g., the crash file contains records of all crashes occurring in the state, the driver file contains records of all drivers licensed in the state, etc. Furthermore, they are essential to provide a comprehensive understanding and quantification of a State's total highway safety problem. Other components described in this Advisory provide the data to support specialized areas of a State's highway safety program (e.g. commercial vehicle safety) or provide supplemental data needed to place a particular safety problem in some proportional context (e.g., demographic data).

As implied above, a complete traffic records system collects and stores data from a variety of sources. These independent databases are governed by policies and procedures unique to those activities, and may not lend themselves to easy integration into a coherent system containing the entire range of safety data comprising a traffic records system. Consequently, achieving such a total *virtual* system relies on collaborative efforts across a number of state agencies and organizations. From a technical standpoint, the individual systems must be designed to permit data to be integrated between two or more databases to compile, as needed, data for analyses to answer questions and identify problems. There should be tools available to present results of any analyses in a manner useful to the end user, such as via the use of maps, tables, and graphs, as well as written interpretations of the data.

This Advisory is intended to assist state officials in evaluating their safety data systems and to identify areas needing improvement, upgrading or acquisition of technological tools. It should be especially useful for a state Traffic Records Coordinating Committee in the development of strategic plans for systems improvements or implementation.

SECTION 1

CORE COMPONENTS OF A STATE TRAFFIC RECORDS SYSTEM

Historically, the data contained in the core components of a traffic records system have been collected to support a variety of state functions. Whenever a car is registered, a driver is licensed, a traffic crash is reported, or a traffic ticket is issued, the data are generated as part of an administrative function that also serves a safety purpose. This dual administrative and safety function of highway safety data makes a traffic records system unique. Although the data are collected by different agencies for different administrative purposes, they are all related to and extremely crucial for highway safety purposes. (See Figure 1 illustrating the interaction among the components of a traffic records system.)

At the time of passage of the Highway Safety Act of 1966, States generally maintained basic files on crashes, drivers, vehicles, and roadways. As highway safety programs matured, many States added systems containing records of Emergency Medical Services (EMS) provided to crash victims and established files specifically to track traffic citations and court adjudications of those citations. Technology advances also increased states' abilities to more accurately identify locations on state roadway systems, thus more accurately locating areas requiring safety improvements and countermeasures.

For purposes of this Advisory, the core components are:

- Crash Information Component

- Citation/Adjudication Information Component

- Driver Information Component

- Vehicle Information Component

- Injury Control Information Component

- Roadway Information Component

Together, these components should provide information about places, property, and people involved in crashes and about the factors that may have contributed to the events described in the various components of the records system.

Other information components that may be useful in support of safety analyses are addressed separately (see Section 3, Other Information). This should include demographic data (social statistics about the general population such as geographic area of residence, age, gender, ethnicity, etc.) to control for differences in exposure (normalization) and cost data for benefit/cost and cost effectiveness determinations.

Section 1 describes the types of information to be included in the core systems (see also Table 1). Section 2 identifies characteristics that determine the acceptable level of quality for each of the core components. Section 3 describes other information components that are useful to enhance and supplement data from the core systems. Section 4 addresses the analytical resources that should be applied to traffic records system data. Section 5 recommends specific management initiatives to maintain a viable traffic records system.

Figure 1: Schematic of Data Flow in a Highway Safety Information System

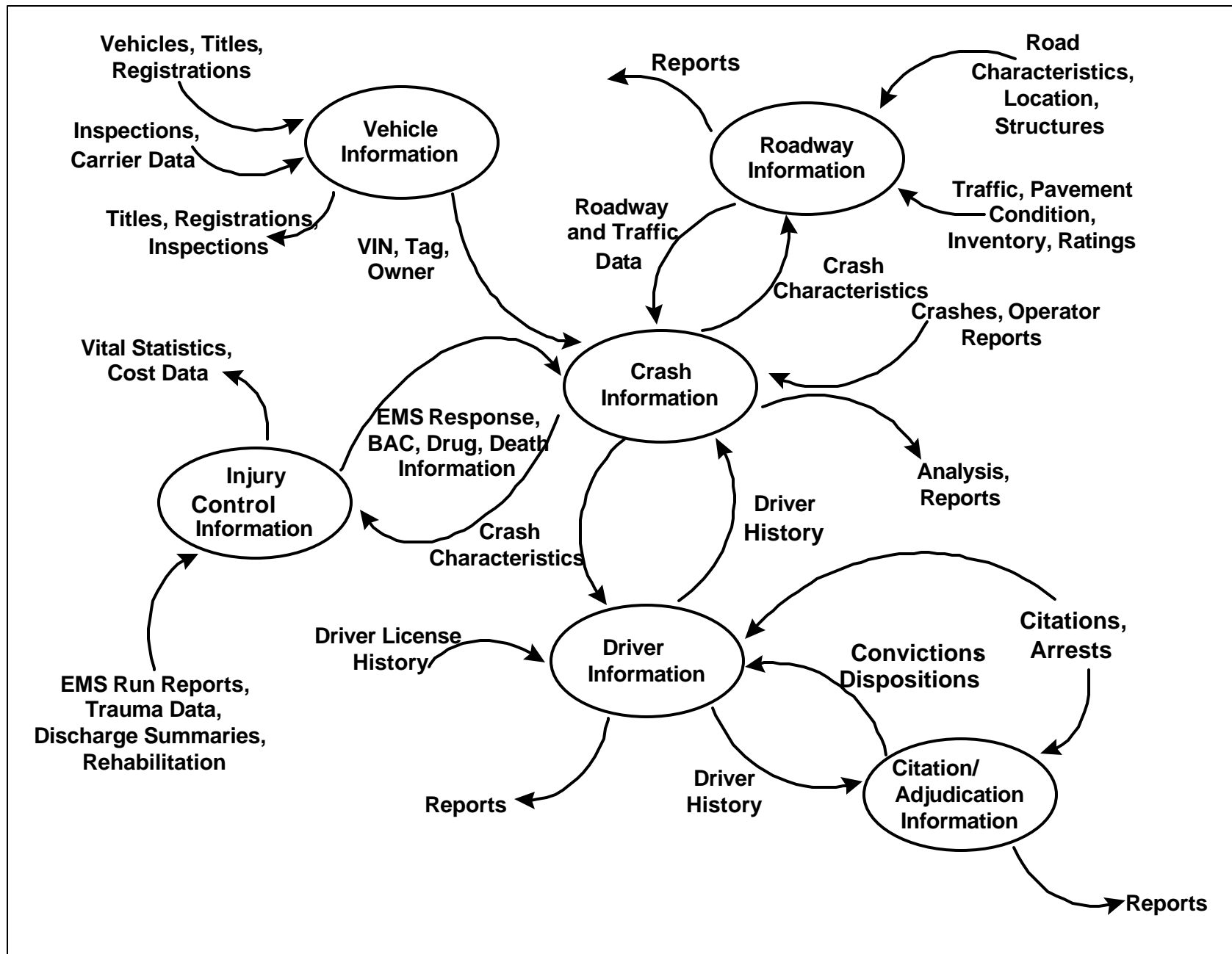


Table 1. Components of a Traffic Records System

COMPONENTS		EXAMPLES
Crash		<ul style="list-style-type: none"> • Weather conditions and pavement • Illumination • Time of Day, Day of Week • Avoidance maneuvers • Violation of traffic law (speed, turns, failure to obey, reckless driving) • Number and severity of injuries or level of property damage • Number of vehicles involved • Manner of collision and speed • Object struck • Person type (driver, occupant, pedestrian) • Substance abuse • Safety device use
Injury Control System		<ul style="list-style-type: none"> • EMS response time for driver/pedestrian/pedacyclist • Hospital assessment of injury severity • Hospital length of stay and cost • Rehabilitation time and cost
Roadway		<ul style="list-style-type: none"> • Location referencing system • Roadway character (jurisdiction, classification, surface, geometries) • Structures (bridges, tunnels) • Traffic control devices, signs, delineations, and markings • Roadside features (hardware, conditions, bike lanes, sidewalks, land use) • Rail grade crossings • Traffic volume and characteristics
Vehicle	All	<ul style="list-style-type: none"> • Type and configuration • VIN • Age/model year • Weight • Registration information/Plates • Defects • Owner information • Safety devices (type and condition)
	Commercial	<ul style="list-style-type: none"> • Carrier information • Hazardous materials/Placards • Inspection/Out of Service Records
Driver		<ul style="list-style-type: none"> • Age/DOB • Gender and Ethnicity • Experience, driver education • License status • Conviction history
Citation/Adjudication		<ul style="list-style-type: none"> • Citation tracking • Traffic case volume • Conviction • Sentencing • Case tracking

Section 1-A: Crash Information

Crash data are the hub of the overall traffic records system. They form the cornerstone of highway safety and injury prevention programs. The Crash Component documents the time, location, environment, and characteristics (sequence of events, rollover, etc.) of a crash. Through links to the crash-involved segments of Roadway, Vehicle, and Driver Information, the Crash Component identifies the roadways, vehicles, and people (drivers, occupants, pedestrians) involved in the crash and documents the consequences of the crash (fatalities, injuries, property damage, and violations charged). In addition to providing information on a particular crash, the Crash Component supports analysis of crashes in general and crashes within specific categories defined by: person characteristics (e.g., age or gender), location characteristics (e.g., roadway type or specific intersections), vehicle characteristics (e.g., condition and legal status), and the interaction of various components (e.g., time of day, day of week, weather, driver actions, pedestrian actions, etc.).

The Crash Component of the traffic records system should contain some basic information about every reportable motor vehicle crash on any public roadway in the State. Details of various data elements to be collected are described in a number of publications. The Model Minimum Uniform Crash Criteria (MMUCC) provides a guideline for a suggested minimum set of data elements to be collected for each crash.

Data should also be collected to meet federal reporting requirements to report crashes involving commercial motor vehicles, commonly referred to as the National Governors Association (NGA) recommended set of data elements. Additional information should be collected (as necessary) to meet other federal reporting requirements (e.g., the Fatality Analysis Reporting System [FARS] and General Estimates System [GES]).

Section 1-B: Citation/Adjudication Information

Information should be available which identifies arrest and conviction activity of the State, including information which tracks a citation from the time of its distribution to an enforcement jurisdiction, through its issuance to an offender, its disposition by a court, and compliance or non-compliance with any court ordered sanctions. Such a “Tracking System” should provide the information to identify the type of violation, location, date and time, the enforcement agency, court of jurisdiction, and final disposition. The state should follow the guideline for a *Model Impaired Driver Records Information System* published by NHTSA.

For citations issued to commercial drivers, the DOT number should be noted on the form and entered into the records system.

The information from a total citation/adjudication information system is useful in determining the level of enforcement activity in the State, for accounting and controlling for citation forms, for monitoring court activity regarding the disposition of traffic cases, and to better enforce court ordered sanctions.

Section 1-C: Driver Information

Driver information includes information about the State's population of licensed drivers. It should include: personal identification, driver license number, type of license, license status, driver restrictions, convictions for traffic violations, crash history, driver improvement or control actions, and driver education data.

Driver information should also be maintained to accommodate information obtained through interaction with the National Driver Register (NDR) and the Commercial Driver License Information System (CDLIS) to enable the State to maintain complete driving histories and to prevent drivers from circumventing driver control actions and obtaining multiple licenses. As regards commercial drivers, the driver information component should be able to distinguish between traffic convictions received while operating a passenger vehicle versus a commercial vehicle. This enables the prosecution of sanctions that are specific to the statutes governing commercial vehicle operation that apply at different levels from passenger vehicle operation.

Section 1-D: Vehicle Information

Vehicle information includes information on the identification and ownership of vehicles registered in the State. Data should be available regarding vehicle make, model, year of manufacture, body type, and miles traveled in order to produce the information needed to support analysis of vehicle-related factors which may contribute to a State's crash experience. Such analyses would be necessarily restricted to crashes involving in-state registered vehicles only.

This information should also be available to readily identify commercial vehicles and carriers which may be registered in other States, but which are licensed to use the public roadways in the State.

Section 1-E: Injury Control Information

With the growing interest in injury control programs within the traffic safety, public health, and enforcement communities, there are a number of local, State, and federal initiatives which drive the development of Injury Control Systems (ICS). These systems typically incorporate pre-hospital (EMS), emergency department (ED), hospital admission/discharge, trauma registry, and long term rehabilitation databases to track injury causes, magnitude, costs, and outcomes. Often, these systems rely upon other components of the traffic records system to provide information on injury mechanisms or events (e.g., traffic crash reports).

This system should allow the documentation of information which tracks magnitude, severity, and types of injuries sustained by persons in motor vehicle related crashes. Although traffic

crashes cause only a portion of the injuries within any population, they often represent one of the more significant causes of injuries in terms of frequency and cost to the community. The ICS should support integration of the ICS data with police reported traffic crashes. The EMS run reports, crash reports, and roadway attributes are the first critical steps in the identification of a community's injury problem, and in turn, the identification of cost-effective countermeasures which can positively impact both the traffic safety and health communities.

The use of these data should be supported through the provision of technical resources to analyze and interpret these data in terms of both the traditional traffic safety data relationships and the specific data relationships unique to the health care community. In turn, the use of the ICS should be integrated into the injury control programs within traffic safety, and other safety-related programs at the State and local levels.

Section 1-F: Roadway Information

Roadway information includes roadway location, identification, and classification, as well as a description of a road's total physical characteristics and usage. The roadway information system should include records for all public roads in the State whether under State or local jurisdiction. The records in the various sub-components of the roadway information system should be identified by a common location reference system, preferably one which is Geographic Information System (GIS) based and tied to coordinates derived from Global Positioning Satellite (GPS) technology. A standard location reference method is essential to link not only the various roadway information records but also records of other components with the roadway system for analytical purposes (e.g., link crashes to roadway locations, link EMS records with crash locations, link crash locations with traffic arrest locations, etc.).

SECTION 2

INFORMATION QUALITY

Data maintained in a State's traffic records system should be of an acceptable level of quality to be useful and reliable. The quality of information in a State's traffic records system is determined by the following characteristics:

- ☐ Timeliness
- ☐ Accuracy
- ☐ Completeness
- ☐ Uniformity (Consistency)
- ☐ Integration (Linkability)
- ☐ Accessibility

The definition of each of these attributes and their relative significance may vary for each information area (crash, roadway, etc.). For example, while a high degree of timeliness may be crucial for entry of actions in a driver history database, it may not be as significant for certain roadway related data.

2-A: Crash Information Quality

- ☐ Timeliness – Crash information should be available within a time frame to be useful for identifying the State's crash problem, and for monitoring and evaluating implemented safety countermeasures. At a minimum, crash data should be available for analytical purposes within 45 to 60 days of a crash. This means that the state should require all enforcement jurisdictions to submit crash reports to the custodial agency within a prescribed time period, for example within ten to fifteen days of a crash, and require the data to be entered into the crash file and available for analyses within another 30 to 45 days.

A state should have as a goal the implementation of an electronic data collection and reporting system (for example, the TraCS or a similar system which relies on the use of mobile data terminals/computers). This would make crash data available on a real-time or near real-time basis (within 24 hours of the crash). Electronic collection enhances the overall quality of the data, thereby the quality of decisions of federal, state and local highway safety managers.

- ☐ Accuracy – Quality control methods should be employed to ensure accurate and reliable crash data. This applies to individual crashes (e.g., validity and consistency checks in the data capture and data entry processes with feedback to jurisdictions submitting inaccurate information), and to the State crash experience in the aggregate (e.g., edit checks to determine if specific data variables or categories are possibly under or over

reported such as putting all unknown crash times into a specific category rather than using imputation methods).

The use of an electronic data collection and reporting system (for example, the TraCS or similar system as discussed above) is recommended because it will allow for more accurate data entry due to the built in edit checks and the ability to populate certain data fields directly from other files or documents, such as the use of driver license or vehicle registration documents to populate driver and vehicle data directly onto the crash report.

❑ Completeness – Crash information should be complete in terms of:

- Data being collected on every crash defined by the State as a reportable crash.
- Data being collected on all appropriate crash variables (i.e., missing information such as crash location, driver license status, vehicle type, whether the crash involved a commercial vehicle, safety belt use, whether there was impaired driving, etc. should be minimal).

The use of an electronic data collection and reporting system (as discussed above) is recommended because built-in controls are generally available to prevent a report from being transmitted until all required fields are completed.

❑ Uniformity (Consistency) – Crash information should be **uniform and** consistent with nationally accepted and published guidelines and standards such as:

- Model Minimum Uniform Crash Criteria (MMUCC).
- Manual on Classification of Motor Vehicle Traffic Accidents, 6th Edition, ANSI D16.1-1996.
- Data Element Dictionary for Traffic Records Systems, ANSI D20.1, 1993.
- EMS Data Dictionary (Uniform Pre-Hospital Emergency Medical Services Data Conference).
- National Governor's Association (NGA) data elements to record data on crashes involving commercial motor vehicles

The state's crash file should contain only "reportable" crashes, i.e., only those crashes that meet the state's reporting threshold. The state should prescribe a crash reporting threshold and should require that all enforcement jurisdictions submit all crash reports meeting that established threshold, for example all crashes that involve a fatality, an injury to a person, or damage to a vehicle exceeding some dollar value.

There should also be consistency over time. For example, the same data elements should be collected for a sufficient period of time to allow for meaningful comparisons within the state and for national aggregation.

When it becomes necessary to change or modify a data element or to change the values or attributes of data elements, this should be clearly documented. Frequently, data element

values are expanded to provide greater detail (e.g., trucks involved in crashes were previously coded as light or heavy; the new values are changed to “under 10,000 pounds, 10,001 – 20,000 pounds, greater than 20,000 pounds).

- ❑ Integration (Linkability) – There should be data elements in the crash file that are common to other files to make it possible to integrate or link crash data with all other traffic records system data files. This should be possible at the individual record level as well as the file level. Linkage at the record level is important in an electronic data capture application to allow driver, vehicle and other data to be added to the crash report, as well as the addition of BAC data as soon as it becomes available. At the file level linkage is necessary to build analytical data sets by merging data from the crash file with data from any or a combination of other files such as citation/adjudication, driver, vehicle, EMS, and roadway data files.

Just as electronic data collection and reporting systems are beneficial to enhancing other quality attributes as described above, they also can enable linkage to be accomplished more efficiently and effectively.

- ❑ Accessibility –Crash data should be readily available and accessible to authorized users. The availability of various query languages allows crash data users to easily access crash data. Analytical packages are also available that permit in-depth analyses of crash data. The expanding use of Extensible Markup Language (XML) to transfer or move data from one database to another removes many of the complexities of sharing data. Access of crash data should be allowed for all organizations and individuals who can claim legitimate use of a State's crash data. Arbitrary and unreasonable restrictions or constraints on legitimate crash data users are discouraged.

Section 2-B: Citation/Adjudication Information Quality

- ❑ Timeliness - Data from an issued citation should be recorded on a statewide citation/adjudication file as soon as the citation is filed in the court of jurisdiction. This should be real-time, but certainly within 24 hours of issuing the citation. Data regarding the disposition of a citation should be entered on the citation/adjudication file, as well as on the driver history record for guilty verdicts, immediately after adjudication by the courts. Again, this should be no more than 24 hours after an adjudication is rendered.

Electronic data collection and reporting systems, using the TraCS or similar electronic data capture technology ~~using~~ which rely on the use of mobile data ~~terminals~~ or computers, ~~is~~ **are** essential to produce timely **citation data**. **Software enhancements to court and driver history files allow for immediate transfer of dispositions to the driver history file. These software enhancements also can eliminate the necessity for DMV personnel to input disposition records. That is, adjudication data can be input by court of jurisdiction personnel into the statewide citation/adjudication file, and appropriate records also can then be uploaded to the driver history file.**

- ❑ Accuracy - The State should employ quality control methods to ensure accurate and reliable information is reported on the citation form and updated on the citation and driver history files as necessary. The use of mag-stripe, bar-code, smart-card scanner technology to directly input driver information onto the citation form is encouraged. Use of electronic citation issuance methods further enhances the processing of citations and the entry of accurate information on the citation.
- ❑ Completeness - All citations issued should be recorded in a statewide citation file with all variables on the form completed including the violation type; the issuing enforcement agency; violation location; a cross reference to a crash report, if applicable; and BAC, where applicable, etc. All dispositions from all courts should be updated on the statewide citation/adjudication file and forwarded for entry on the driver history record. The use of an electronic data collection and reporting system is recommended because built-in controls are generally available to prevent a citation from being transmitted until all required fields are completed.
- ❑ Uniformity (Consistency) - All jurisdictions should use a uniform traffic citation form, and the information should be uniformly reported throughout all enforcement jurisdictions. Use of an electronic version of the citation makes it easier to assure that all citations are produced using a uniform set of data.
- ❑ Integration (Linkability)- The citation/adjudication file should have elements common with other files in the traffic records system. Especially critical is the ability to link citations and their judicial disposition with driver records to insure the actions are recorded against the correct individual.

The ability to merge citation/adjudication data with other files in the traffic records system is also important for analytical and study purposes. For example, the citation should record the location of the violation using the same location reference method used for locating crashes. This would permit the state to compare its crash experience with its enforcement activity, especially valuable in comparing where alcohol involved crashes are occurring with the locations where drunk driving arrests are being made. Where a citation is issued in connection with a crash, the crash report number should be recorded to allow for future merging of data from the two files for analyses of traffic violations contributing to crashes.

Electronic generation of citations and electronic transmission of the data to the courts, to enforcement agencies, and the driver licensing authorities, would enhance the overall ability to provide the commonality needed for integrating enforcement and judicial activity with other highway safety activities.

- ❑ Accessibility – Citation/adjudication files should be available and accessible to all authorized users, especially those charged with the state's highway safety programs. This can be accomplished by software specifically installed to maintain the

citation/adjudication system and available to court and justice personnel, and on more of a restricted basis to other authorized users by providing sanitized excerpts of the data on request or periodically providing the sanitized excerpts to a data warehouse if one is being maintained by the state.

2-C: Driver Information Quality

- ☐ **Timeliness** – Routine license issuance information should be updated at least weekly. However, adverse actions (license suspension, traffic conviction) should be posted immediately but no less frequently than daily. Convictions of traffic violations should be received from courts via electronic transmissions to insure availability of a driver's most current driving record.
- ☐ **Accuracy** – The State should employ methods for collecting and maintaining driver information that makes use of current technologies (e.g., magnetic-stripe, bar-codes, smart-cards). Posting of conviction data received electronically from the courts insures a higher rate of accuracy and insures posting more accurately to the correct individual's record.
- ☐ **Completeness** – The information should be complete in terms of data elements (e.g., unique personal identifiers and descriptive data such as name, date of birth, gender) and complete in terms of all prior driving history, especially adverse actions received from other States either while licensed elsewhere or while driving in other States. The driving record should include records of prior convictions received while licensed in previous states of residence.
- ☐ **Uniformity (Consistency)** – Information maintained on the state's Driver File should be compatible for exchange with other driver-related systems such as the National Driver Register (NDR), the Commercial Driver License Information System (CDLIS), and other applications for interstate exchange of driver records, especially those facilitated via the American Association of Motor Vehicle Administrators Telecommunications Network (AAMVANet).
- ☐ **Integration (Linkability)**- Driver data needs to be linkable to other files within the state's traffic records system, especially the crash and vehicle records files. Enforcement officers need to be able to determine driver information when only the vehicle registration number is known and vice versa.

Analysts may need to examine driver factors that contribute to crashes such as prior driving record, age, demographics, etc. To extract additional information about drivers involved in crashes analysts need to be able to merge records from the crash file with driver history data. Elements common to both files, such as the driver license number, must be available to permit such linkage. It is also essential that driver records in the driver files have elements common to records in court citation records to insure that

judges can retrieve records pertaining to the same individual whose case is being currently adjudicated.

- ☐ Accessibility - Driver data needs to be available to authorized users beyond those responsible for the daily operations of the driver licensing authorities. The data may be accessible either from the operational file, such as required by enforcement personnel, or from extracted versions such as in a data warehouse operation required for highway safety analyses.

2-D: Vehicle Information Quality

- ☐ Timeliness – The information should be updated at least annually.
- ☐ Accuracy – The State should employ methods for collecting and maintaining vehicle data that produces accurate data and should make use of current technologies designed for these purposes. This includes the use of bar-coded vehicle registration forms that allow scanning of vehicle registration information directly onto appropriate forms (citation, crash, other forms).
- ☐ Completeness – The information should be complete in terms of the vehicle ownership, registration, type, VIN, etc. Information on vehicle miles traveled (VMT) by type or class of vehicle should be available. For commercial vehicles, completeness also involves collection and availability of standard data elements (such as the NGA elements, a set of data developed and recommended by the National Governors' Association for collection of data from crashes involving commercial vehicles).
- ☐ Uniformity (Consistency) – The same data elements should be collected over time and they should be consistent with the data elements contained in the other components of the traffic records system. Should it become necessary to change or modify a data element or to change the values of data elements, this should be clearly documented.
- ☐ Integration (Linkability) – Vehicle data needs to be linkable to other files within the state's traffic records system, especially the crash and driver records files. Enforcement officers need to be able to determine driver information when only the vehicle registration number is known. To extract additional information about vehicles involved in crashes analysts need to be able to merge records from the crash file with vehicle data. Elements common to both files, such as the VIN or vehicle plate number, must be available to permit such linkage.
- ☐ Accessibility – Vehicle data needs to be available to authorized users beyond those responsible for the daily operations of the vehicle registration and titling agency. The data

may be accessible either from the operational file, such as to enforcement personnel, or from extracted versions, such as in a data warehouse operation, to highway safety managers.

2-E: Injury Control Systems Information Quality

- ☐ **Timeliness** - Ideally, medical data on an injury should be available within an Injury Control System (ICS) in the same time frame as data about the crash is available elsewhere within the traffic records system. The use of electronically generated EMS run reports is essential to achieve this level of timeliness. However, the subsequent medical records on the individual may be incomplete initially because local protocols dictate that the medical record is only placed in the ICS when the patient leaves the health care system (e.g., discharged). Every effort should be made to integrate the ICS record with the crash data as soon as the medical records become available.
- ☐ **Accuracy** - The State should provide local health care providers with training and support in the accurate coding of injuries and should foster the proper use of the resulting ICS data through education of data users in proper interpretation of these data.
- ☐ **Completeness** - Although a trauma registry based ICS can provide a valuable source of ICS information, it cannot provide a complete picture of the injuries within a community or State. Where possible, the ICS should represent a consensus of all injuries that occur within the community. The ICS should, where feasible, be maintained at a State level but, at a minimum, should be maintained at the local level.
- ☐ **Uniformity (Consistency)** - The reporting of EMS run data, hospital ED and admission data, trauma registry data, and long term health care data should be consistent with statewide formats which should follow national standards such as ICD-9-CM, as published by the Centers for Disease Control (CDC), the use of Injury Severity Scale standards, etc.
- ☐ **Integration (Linkability)** - There should be data elements in the ICS files that are common to other files to make it possible to integrate or link ICS data with all other traffic records system data files. The true power of the Injury Control System can only be realized when the ICS data are integrated with other traffic records systems data such as traffic crash, roadway, and crime data, as well as internally between EMS runs, hospital/ED admission data and discharge data. The ICS should be implemented in a fashion that supports this integration in as efficient manner as possible. Often GIS systems provide the ideal platform for linkage and interpretation of the ICS and traditional traffic records system data. The use of common identifiers whenever possible within the traditional traffic records system and ICS data systems will facilitate this integration effort.

Use of electronically generated EMS run reports can enable linkage to be accomplished more efficiently and effectively.

- ❑ Accessibility –Recognizing the issues of patient confidentiality, there should be mechanisms in place to balance the demands for data accessibility from end users and the requirements of state and local privacy rules. At a minimum, the traffic safety and injury control communities should be able to access these data in summarized reports designed to address specific needs, including injury type and severity cost data. Ideally, the system should support the creation of “sanitized” extracts of the ICS data for use in research, problem identification, and program evaluation efforts. These extracts may be placed in a data warehouse together with other copies of traffic records files to facilitate their accessibility.

2-F: Roadway Information Quality

- ❑ Timeliness – The information should be updated as required to produce valid analysis. This implies that changes on the roadway (e.g., construction, sign improvements) should be available for analysis as soon as a project is completed. This also implies that roadway information should be reviewed, minimally, on an annual basis, and all necessary updates and revisions made to the roadway file within 60 days of the annual review.
- ❑ Accuracy – The State should employ methods for collecting and maintaining roadway data that produce accurate data, and the State should make use of current technologies designed for these purposes. Data on the roadwayfiles should be corroborated using a secondary data source(s). This should be done on a periodic basis, and differences between roadway file data and data from the secondary source(s) should be reconciled within 60 days. Roadway location data in particular should be as accurate as possible by using GIS based mapping and GPS locator devices
- ❑ Completeness – The data should be complete in terms of the miles of roadway, the traffic way characteristics, the highway structures, traffic volumes, traffic control devices, speeds, signs and other inventories.
- ❑ Uniformity (Consistency) – The same data elements should be collected over time and for various classes of roadways. Should it become necessary to change or modify a data element or to change the values of data elements, this should be clearly documented.
- ❑ Integration (Linkability) - Roadway data should be linked with crash data to determine crash location and to corroborate roadway type indicated on the crash report. Regular analyses of linked roadway and crash data should be completed to determine high crash locations and to determine if roadway characteristics provided in the crash report match those roadway characteristics as indicated on the roadway file. Differences between the

reported crash roadway characteristics and those indicated on the roadway file suggest that there is an error or errors in one or both of the data files. For example, the crash location may be in error, an incorrect roadway code may have been entered, or there could be errors with GPS equipment or the GIS base-map.

- ❑ Accessibility - Users who need roadway data for traffic and transportation safety analytical and research purposes should be allowed access to Roadway data. The use of XML can facilitate the exchange and sharing to data. Placement of selected extracts in a data warehouse may also facilitate the sharing of roadway data.

SECTION 3

OTHER INFORMATION

The state's traffic records system should acknowledge the importance of, and incorporate where feasible, other types of information from the state and local level that will be useful in the identification of traffic safety problems and the evaluation of countermeasures. These supporting components may include:

- ☐ Geographic Information Systems (GIS) and Global Positioning Satellite (GPS) data.
- ☐ Insurance data (carrier, policy number, expiration date, claims cost).
- ☐ Safety Program Evaluation data.
- ☐ Data specifically required or requested by State or Federal programs including:
 - ☐ Fatality Analysis Reporting System (FARS) – the state should have in place procedures to acquire reports of all fatal crashes and the required supplemental data, such as BAC levels, and provide to the FARS system at NHTSA.
 - ☐ SAFETYNET – the state should have in place procedures to acquire reports of all crashes involving commercial motor vehicles for entry into SAFETYNET.
- ☐ Demographic data (data on the State's population including gender, age, rural/urban residence, ethnicity) sufficient to be used in normalizing crash data to the State's general population.
- ☐ Safety Belt survey data (usage rates for safety belts, child passenger seats, motorcycle and bicycle helmets)
- ☐ Behavioral data (e.g., occupant protection usage).
- ☐ Attitude/perception/knowledge data (e.g., telephone surveys, focus groups).
- ☐ Economic loss data (e.g., medical, insurance cost, workers' compensation, lost productivity).
- ☐ Inventory - Each State should have in place procedures that result in the compilation of an inventory of State and local information sources. This inventory should include information on the source, ownership (contact agency/person), quality, and availability of these data from each information source.
- ☐ Performance data - Performance level data, as part of a traffic records system, are those measures relating to an ongoing or proposed countermeasure that addresses a crash problem. They can include number and types of citations and convictions, number or

percent of drivers and occupants using occupant protection, average Blood Alcohol Concentration (BAC) levels, average speeds, percent of injured receiving EMS response, recidivism rates for past offenders/crash-involved drivers, highway countermeasures (e.g., breakaway signs), etc.

- ❑ Cost data - Cost data consist of dollar amounts spent on countermeasure programs, together with the costs of fatalities, injuries, and property damage crashes. The National Highway Traffic Safety Administration (NHTSA), the National Safety Council (NSC), and other national and State agencies have published cost data for use by the States. NHTSA has also made easy-to-use cost modeling software available. In addition, specific local costs can be accumulated through injury surveillance systems or other means of collecting treatment costs and outcomes.
- ❑ ITS data – Intelligent Transportation Systems (ITS) is becoming of major importance in traffic safety and traffic mobility. ITS also has an enormous potential for capturing traffic safety data. The first area where ITS can facilitate the capture of traffic safety data is documenting crash events. This can be accomplished through video monitoring systems where data are archived. The archived data can be reviewed to ascertain where a crash report was completed on the date and at the time of the observed crash. The archived data can also be used to corroborate data contained in a crash report such as date, time, crash location, vehicle type(s), and time of arrival of emergency vehicle(s).

ITS can also be used to record normalizing data such as vehicle counts (ADT, AADT) by vehicle type, by location, time of day, and day of week. Normalizing data is needed for data analysis where comparisons are made across time and across geographical locations.

SECTION 4

DATA ANALYSIS RESOURCES

The purpose of a state's traffic records system is to establish a base of information and data that is available and useful to its customers. This includes operational personnel, program managers, program analysts, researchers, policy makers, and the public. To be of optimal value, the system should provide the end user with the resources required to access the data in the system, to combine data from the various data sources within the system, and to perform analyses of those data. These resources should include the software, system/file architecture and procedures for data analysis, data integration, and data sharing.

These system resources should provide the information to support the state's needs to identify safety problems, to manage and evaluate countermeasure activities and programs, to conduct research on the state's safety experience and issues, and to establish safety priorities and policies.

Fiscally prudent **program management** places demands on the traffic records system for information to monitor progress and to evaluate the impact of countermeasure programs and activities (e.g., changes in alcohol-related injuries as a result of an enforcement project, monitoring of construction zone crashes during a project, etc.). A state needs the proper analytical tools to decide which programs are cost effective and have the desired safety impact.

Research is required to identify safety problems and trends to accurately project future budget and programmatic needs. Only through efficient data analytical processes can such research be accomplished.

Policy decisions must be based on reliable data, on a presentation that lends confidence to the data, and on the interpretation of the data. Such levels of information quality can only be achieved with the application of sophisticated analytical tools.

4-A: Data Integration

As demands for a safer, more efficient highway system continue to grow, there has also grown a need for data to be used across agency boundaries, and for data from across the separate systems within these agencies.

For example, a traffic engineer in the highway department may need to merge crash data maintained in the motor vehicles department with data from more detailed roadway files. Law enforcement personnel may need to integrate data from the crash file with citation files to compare the location of their DUI enforcement activity with the location of alcohol-related crashes. The state needs to have the ability to correlate records in the crash file with the driver file to analyze the driving histories of crash involved drivers. Linking crash files with driver and vehicle files presents opportunities for operational efficiencies such as automatically populating

crash data into a driving record. Crash data needs to be linkable to EMS and other Injury Control files (and all Injury Control files with each other) to evaluate the medical outcomes of crashes.

While the various information sources may exist separately, these sources should be easily tied together. System and data integration can eliminate the need to duplicate data, and can reduce data collection, entry, and storage costs.

The ability to link data in a particular file with another is addressed in the discussion of the individual file quality characteristics in Section 2 above. That section focuses on whether a file has elements in common with another file to enable merging of those files. This section addresses the need for a capability to perform that merger or linkage of data.

The state should have resources such as a data warehouse type of operation and appropriate software for data integration to effectively meet their needs for the entire range of traffic records data. A data warehouse may be used to select crash and other related data for analysis and research. Managers of the various traffic records system components should provide extracted sets of negotiated data from their respective files to be placed in a data warehouse. Users should be able to select data from any of these files individually or select and merge data from a number of these files.

4-B: Data Analysis

The state's traffic records system should consist of software tools necessary to allow the safety professional to perform analyses on data from the various files available in the traffic records system. The software should allow the user to query the various data files, and to generate databases in formats compatible with available data analysis software packages. The existence of a data warehouse operation as discussed above would greatly enhance the efficiency of obtaining the necessary data.

Data analyses are especially critical in the overall management of the state's traffic safety programs. Analytical processes should be applied to the management functions of problem identification, program evaluation, and policy-making. They should be applied to the production of ad hoc reports to answer spontaneous queries as well as to the production of statistical tables for inclusion in periodic publications or for placement on a department's Web site. The data analysis software should provide the user with flexibility to produce various subsets of data, to sort and resort the data and to generate simple summaries or specialized analyses.

SECTION 5

MANAGEMENT INITIATIVES

The development, maintenance, improvement, operation and use of a state traffic records system and its resources depend on an ongoing process of review, planning, and coordination, and the maintenance of a level of competency among all involved parties.

5-A: Coordination

There should be a statewide traffic records coordinating committee (STRCC) with representation of the interests from all levels of public and private sector traffic safety stakeholders, as well as from the various disciplines that have a need for traffic safety information. The committee should be formed within State policy and legal guidelines and institutionalized and empowered with the responsibility (through formal agreements) to recommend traffic records system policy and procedures. The State should provide a mechanism to ensure support for the administration and continuance of the coordinating committee, as well as provide technical guidelines for operating the STRCC. A correctly constituted and empowered STRCC should be responsible for the oversight and completion of a number of tasks. These include: establishing requirements for file structure and data integration; assessing system capabilities and resources; establishing goals for improving the traffic records system; evaluating traffic records system components on a periodic basis; developing cooperation and support from stakeholders; and ensuring that timely, accurate and complete data are available to all appropriate users.

5-B: Strategic Planning

The traffic records system should be operated in a fashion that supports the traffic safety planning process. The planning process should be driven by a traffic records system strategic plan that helps State and local data owners identify and support their overall traffic safety program needs. The first step in the development of a strategic plan should be an assessment of the state's traffic records system following the NHTSA methodology for the conduct of traffic records assessments.

The plan should include the following components:

- ☐ Statement of the state's traffic records system goals and objectives.
- ☐ Description of the current status of the state's traffic records system, the deficiencies in the current system and how they were identified (e.g., via the NHTSA assessment noted above), the proposed improvements to correct the deficiencies, a prioritization of those actions and a schedule of implementation.
- ☐ Performance based measures by which progress toward the achievement of the improvements will be measured.

- ❑ How adoption and integration of new technology will be applied to the planned improvements. This includes all data operational phases (i.e., data collection and reporting, processing, linkage, retrieval, and analysis).
- ❑ How improvements will affect the ability of the state to be responsive to the needs of local stakeholders.
- ❑ How improvements will achieve integration between state and local data systems to eliminate duplication of data and help assure timely, accurate and complete traffic safety information.
- ❑ How improvements will achieve data integration among all components of the traffic records system.
- ❑ How the improvements will achieve compatibility and interoperability of the state data systems with national data systems (e.g., FARS, NDR, CDLIS, SAFETYNET).
- ❑ How national data element standards and guidelines will be incorporated, (e.g., MMUCC, ANSI-D20.1, ANSI-D16.1, NGA, EMS Data Dictionary, etc.).
- ❑ How the state will meet various federal data requirements such as those associated with the regulation of commercial motor vehicle safety.

The strategic plan should be endorsed by, and continually updated through the activities of the Statewide Traffic Records Coordinating Committee (STRCC).

5-C: Training and Staff Capabilities

Throughout the data gathering, interpretation, and dissemination process, there is a continuing need for training and technical support. A training needs analysis should be conducted for those highway safety professionals involved in program development, management, and evaluation. Training should be provided to fulfill the needs identified in this analysis. There should also be an ongoing outreach program for users of traffic safety program information to assure that all users are aware of what data are available and how the data can be accessed and used for their traffic safety information requirements. Specialized training in the use of any data analytical software acquired by the state is also necessary.

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GLOSSARY OF TERMS AND ACRONYMS

AAMVANet	American Association of Motor Vehicle Administrators Telecommunications Network
ADT	Average Daily Traffic
AADT	Annual Average Daily Traffic
ANSI	American National Standards Institute
ANSI D16.1	Manual on Classification of Motor Vehicle Traffic Accidents
ANSI D20.1	Data Element Dictionary for Traffic Record Systems
BAC	Blood Alcohol Concentration
CCSRs	Comprehensive Computerized Safety Record-keeping System
CDC	Centers for Disease Control
CDLIS	Commercial Driver License Information System
CODES	Crash Outcome Data Evaluation System
ED	Emergency Department
EMS	Emergency Medical Services
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GIS	Geographic Information Systems
GPS	Global Positioning System
ICD-9-CM	International Classification of Diseases, Volume 9, Clinical Modification
ICS	Injury Control Systems
MMUCC	Model Minimum Uniform Crash Criteria
NDR	National Driver Register
NGA	National Governors' Association
NHTSA	National Highway Traffic Safety Administration
NSC	National Safety Council
STRCC	Statewide Traffic Records Coordinating Committee
TEA-21	Transportation Equity Act for the 21 st Century
TRB	Transportation Research Board
VIN	Vehicle Identification Number
VMT	Vehicle Miles Traveled

